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Linking Renewable Energy Sources for the Development of Rural India

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ABSTRACT : *The energy circumstances in Rural India is portrayed by lower quality fuel, inefficient use, non reliable power supply and restricted approach towards the usage of current energy sources (Reason being Financial, Social or Cultural Barriers). Poverty declination and economic prosperity can be achieved only if natural resources are managed on a sustainable basis. About 450 million people in rural areas are still without access which is provided by Contemporary/Renewable energy services. Not only does this affects their economic growth, but also improves and diversifies their standard of living and affects the environment too. The unsustainable use of local biomass and an increasing dependence on fossil fuels are leading to environmental depreciation at local level, territorial and global levels. Decentralized distributed generation (DDG) techniques for a rural energy supply, based on renewable energies will give opportunities to improve upon economic growth and increase income in rural areas, while also enhancing the sustainable management of natural resources (both Conventional and Non - Conventional). The paper will analyze the current state of the usage of renewable energy systems and technologies and henceforth throw light upon necessary remedial actions that are vital in order to enhance the use of these applications/technologies.*

KEYWORDS: *Decentralized Distributed Generation, Renewable Energy, Rural Development, Sustainable Energy*

I. INTRODUCTION

Renewable energy sources (hereafter, RES) is being taken as a strongly prominent new resource of jobs and rural growth in Developing countries such as India, and a method of validating environmental and energy security issues. In many of the countries, government have invested large amounts of public money to support RES development and are requiring significant amounts of it to be sold by energy generators. But what are the economic implications of these standard policies and investments? Can RES really help to rejuvenate rural economies? These are some of the questions explored with the help of this Paper.

It finds that while RES indeed shows an opportunity for stimulating economic growth in hosting communities, it also requires a stringent but flexible policy regulation and a long-term planning. RES is not going to create lot of jobs, but rather some additional employment opportunities in rural areas. Making a positive remark between RES development and increase in local economic growth will require more decisive strategies, the right match of local scenarios, and a position-based methodology to distribution of forces to achieve the set target.

II. CURRENT SCENARIO IN INDIA

The current rural scenario in India is such that approx 450 million people [1] live in the archaic conditions even after 65 years of Independence and when the modern era is full acquaintance with the latest and modern technology. The state is such that still many of the places in India exist which are still deprived of electricity. Most of the rural people are under the age of 25 with a very low or no employment. Their migration to urban and sub-urbs of the city is leading to various other problems like social unrest, riots, bottlenecked emotions etc.

Current Applications which are going on in Rural Regions based o the RES can include Liquid fuel lighting(obtained from biomass, biofuels, etc), Thermoelectric based lighting, Solar based Water Pumping and Street lighting, solar lanterns and domestic lighting, Wind energy based Motor and Pump driving from various applications, use of Hybrid Systems etc.

But still the lack of the energy resources and improper utilization of these available energy resources causes economic stagnancy and community turbulence. This also has an adverse effect on the people and the

society on a whole. As per the National Electricity Policy 2005, Per Capita availability of electricity increased to over 1000 units by 2012 and the target is to achieve more that 1257 units by the end of the 12th Plan(2016-17)[2]

Governance in India

Energy Security problems in India are result of improper governance. Centralized generation and vigilance leads to corruption. Decentralized distributed generation leads to transparency. Multiple ministries and Power Distribution regimes in GOI have further added on to the problems.
With proper governance, one of the best technological solutions for the above problems is energy generation through agriculture.

Energy production from agriculture can inculcate rural growth and generate employment. It can gather 65% marginalized people into Conventional/ White - bread India, without which India can never imagine of becoming a supreme Economic Power.

Idea for Energy Generation

It can be obtained from crops and residues. It can generate 3 types of fuel:

1) Liquid fuels like ethanol, biodiesel or pyrolysis oil.
2) Gaseous fuel like methane (biogas).
3) Electricity generation via biomass-based power plants.[3]

Residues can produce 158 b l/yr of ethanol which is 43% of India's oil demand or 80% of oil demand via pyrolysis oil or 80,000 MW of electric power. Electricity and liquid fuel production in rural areas will bring tremendous prosperity. In India it is estimated to be 10 - 12 billion dollars/yr. With increased industrial demand for fuel and electricity, large tracts of farmlands may come under fuel crops. It can also provide approx 25 m jobs which could also lead to the Migration Stability in India.

Energy Devices Development and Enhancement

High end technology equipments are the basic demand for rural areas as it will lead to efficient and high energy generation. The Renewable Energy Resources should be in debasing forms.
Highly efficient devices will allow maximum energy and materials to be extracted for high end purposes.
Distinctive characteristic of evolution is decrease in size and increase in complexity and efficiency. All of latest technology incorporating devices follows this path.

Financial and other Instruments

GOI should provide Subsidies, tax incentives and benefits and they must be used properly. Also there emerges a need for rural energy venture funding. Agricultural producers should be provided with Special packages for production of energy.
Latest energy systems in rural areas need better management and skilled labor with technology specialization.
There should be Partnership of corporations, NGOs along with the villagers and there should be highly trained manpower for the merchandise and machinery.

III. VANTAGE POINT FOR RENEWABLE ENERGY SOURCES

What does renewable energy offer rural areas?

- Generate new revenue sources which increase the tax base in rural sections and can support better service inclusions.
- New job and business opportunities especially when a huge group of persons is involved and when the RES activity is well integrated within the local economy.
- Innovations in products, practices and policies in rural areas for hosting RES.
- Capacity building and community enhancement: As people become more specialized and learn skills in the new industry, their willingness to learn and innovate is increased.
- Affordable energy in remote rural areas with the opportunity to become self sufficient energy generators instead of importing conventional energy from outside

The policy drivers of renewable energy

The growth in the distribution forces of RES has observed three interlinked reasons:

- To enhance energy security;
- To preserve the climate and the environment from wallop of fossil fuels use

- To inspire economic growth, specially linked with land-related and marine industries (agriculture, forestry, etc.), or with production.

IV. KEY CHALLENGES AND BARRIERS

Challenges

1) Embed energy strategies in the local economic development strategy so that they reflect local potentials and needs.
2) Integrate RES within greater supply chains in rural economies, such as agriculture, forestry, traditional manufacturing and green tourism.
3) Limit subsidies in both scope and duration, and only use them to promote RES projects that are close to viability in market scope.
4) Avoid forceful types of RES on areas those are not suited to them.

Barriers:

Economic barriers

The main reason for the above is that RE Technologies are not generally cost effective with conventional technologies under current pricing mechanisms.

Structural barriers

These may include regulatory and policy uncertainties, institutional and administrative frameworks, and infrastructure which are poorly designed with conventional fuels in mind that may be unmatched to other distributed energy supply or the high up-front capital demand of RE schemes.

V. RENEWABLE ENERGY AND RURAL DEVELOPMENT: THE LINK

The characteristics of renewable energy commitment in rural areas

Rural areas attract a large part of overall investment. Installations have to be made where renewable sources of energy are available in abundance. For these reasons, low density areas – i.e. rural areas – are more likely to have these features and so they are the most likely locations for RES installations. Investments in RES sectors in rural regions have come from many resources, both public and private.

New sources of revenue to strengthen key public services and infrastructure

RES provides rural communities with new sources of income generation that can in return benefit public services and infrastructure.

Jobs and business opportunities

Although RES is widely thought of to be more labour intensive than conventional fuels usage but it still remains a capital-intensive commodity. The energy sector in general is capital intensive, and this remains valid for solar, wind, and hydroelectric energy production.

Learning Methodology involved in rural innovation

• Learning by searching generally taken as Research and Development or in simple terms explains learning by studying
• Learning by doing takes place at the production stage and enhances production skills in people, organizational structures and manufacturing practices.
• Understanding by diffusion and increased adoption of a product leads to improvements.
• Analyzing by interaction Results from close producer-user contacts.

There are two main ways in which RE can involve a large number of people at the regional level:
i) By linking to existing – and successful – rural industries;
ii) By involving a large number of small and medium enterprises (SMEs). [4]

Capacity addition and community authorization

RES policy can build capacity in rural communities by helping rural communities distributing workforce for sustainable energy management according to their needs, potentials and requirement.

Affordable and dependable energy for remote rural communities

RES can decrease the cost of energy in remote regions. RET provides remote rural areas with the favorable chances to produce their own energy (electricity and heat) more preferable than importing costly conventional fuels and relying on other regions/communities/cities.

VI. REMEDIES

This base of this paper was to analyze the main problems involving energy provision for poor people and the rural commodities. Some of the remedies which can be beneficial are listed as under.

- Financial support policy options for the electricity sector
- Concept of Feed-in tariffs (FITs) Net Metering ensuring the renewable energy/electricity generator is guaranteed a fixed purchase price per kWh for their production.
- Tradable green certificates (TGCs) or renewable energy certificates (RECs) gives an opportunity to the generator of separating the actual power from its "greenness". The RES power is traded in the normal market but green energy producers can also sell a certificate, representing a certain amount of electricity which is generated RES.
- Tenders are used when a regulatory body announces that it wishes to install a certain capacity of a given technology in a particular place or region.
- Tax incentives or credits are particularly circulated to support and increase the use of RE technologies
- Direct cash grants/rebates can be used to deduce high investment costs and so increase returns for investors.

Getting the right policy mix through national and regional level

- An effective policy response would be able to resolve the most prominent of the nonfinancial barriers, while also providing financial support measures where required.[5]
- By provision of a predictable and transparent RES policy framework along with the integration of RE policy into an overall energy strategy will also help in making a better management structure.
- Having a dynamic approach to policy implementation, differentiating according to the current maturity level and aspect of each individual RE technology will enhance the mixture proportionality and lead to a better result oriented approach.
- Early stage identification of the overall system integration issues (such as infrastructure and market design) that may lead to hindrances in the project

Exhibiting equivalence for the drivers of renewable energy workforce

RES policy is expected to deliver in three key areas: energy security, climate change mitigation, and economic development. The economic development driver of RES allocation of workforces gained pace during the initial phases of the financial crisis. A widely held assumption is that investment in RE will trickle down to other sectors, such as construction, manufacturing and services, thus creating new employment opportunities in countries and regions.

The mismatch between renewable energy and transmission infrastructure policy

An energy grid is a basic factor in the ability of a rural region to export, or distribute locally, renewable electricity (and biogas in gas grids). Often RES policy is narrowed on energy installations and does not take into account any upgradation of old infrastructure that may be further required to distribute the additional energy generated by the RES installations.

Policies to ensure that renewable energy deployment benefits rural areas

- Avoid applying generic criteria's that ignore the acceptability of local conditions and the opportunities for integrating RE into local structure.[6]
- Limit subsidies in scope and duration and in value and use them only to induce RES projects that are close to being viable in the market.
- Ensure RES activities are integrated within a stipulated energy framework that manages the dispatch and integration into the grid.

VII. CONCLUSION

The base of this paper focused on the link towards the rural development through the renewable energy resources. It explained the current status of the rural India and what all were the factors which were responsible for the usage of the renewable energy sources what were the vantage points for the Renewable energy sources. It was also discussed what were key challenges and the barriers which led to the shortfall for the RES to be used in the rural regions. Later the link was established and the factors were highlighted as of what were the major constraints and the key points which were to be kept in mind during the implementation of RES in rural areas. Further moving on it was realized that after the implementation of certain remedial measures, the stagnant issues

could be removed and the usage of RES in the rural development would be greatly beneficial for the stability in Energy Security for Rural India.

There exists a vast opportunity for the usage of Res but still the unexplored energy resources and improper utilization of these available energy resources causes economic stagnancy and community turbulence. This also has an adverse effect on the people and the society on a whole. So on the whole the society with the Government of India's intervention can lead to a better Energy secured India with the Climate and environment protection leading to a sustainable Economic Growth.

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